J. N. Shafer

West Virginia University

NSG - 533

Progress Report Grant # [redacted] 3/31/65

3P.

The Effect of Sensory Deprivation on Social Dominance in the Domestic Cat

Cole Nore
Tulsa OK 62546

A. Summary of investigations to date.

The effect of sensory deprivation on the dominance behavior of domestic cats was investigated in two separate experiments involving widely desperate test situations. The two test situations were (1) food competitive behavior and (2) competitive shock avoidance. The two experiments will be summarized separately.

Experiment #1 - Effect of sensory deprivation on food competitive dominance behavior.

Subjects: The subjects were eight domestic cats selected from a colony of animals maintained by the Psychology Department at West Virginia University. The age-range of the Ss varied between eleven and fifteen months with a mean age of 12.4 months.

Apparatus: The Ss were tested in a WGTA, described by Harlow (1949). The dimensions of the WGTA have been given by Cole (Diss. Abst., 1964).

The eight animals were isolated from social contact in a corresponding number of isolation chambers. The dimensions of each of the chambers were 32 x 24 x 32 inches. They were constructed with 1/2" plywood and were insulated with 1/2" Cellotex. Each of the chambers was ventilated by means of two series of holes, one across the front floor, the other across the rear ceiling. Air was circulated through the chambers by blowers located outside the chambers.

Procedure: The Ss were pre-trained to respond in the WGTA until each animal was proficient in obtaining food. Following the pre-training the eight subjects were tested by the method of paired comparisons every third day until a total of six comparisons had been completed. Assignment of Ss followed a restricted randomization procedure so that no S was tested in two consecutive pairings. In each pairing the Ss competed five separate times for the highly preferred food (liver) under 24 hr. food deprivation.

Dominance was determined by the number of pieces of liver obtained by each S. The S obtaining the greatest number of pieces of food was ranked first in the hierarchy, the S obtaining the second greatest number was ranked second, etc.

The eight animals were placed in isolation on the day following the final series of paired comparisons. They remained in isolation for 21 days. On the seventh day, the animals were removed from the isolation chambers and placed directly in the WGTA, so that only two animals were removed from isolation at any given time. The entire series of paired comparisons was again run and the animals immediately replaced in isolation. This procedure was replicated on the fourteenth and twenty-first days of isolation.

Results: The stability of the hierarchy before and after isolation was tested by Kendall's coefficient of concordance and X^2. The pre-isolation and the post-isolation distribution of food for all comparisons differed from chance or rectangularity at or beyond the .001 level as tested by X^2. Kendall's coefficient of concordance computed separately on both pre and post-isolation comparisons revealed a highly stable ($P. < .001$) dominance hierarchy. When Kendall's coefficient of concordance was computed on the combined data of both pre and post-isolation comparisons the relationship was again at a high level of significance ($P. < .001$). From the data it can be concluded that 21 days of isolation has no differential effect on the highly stable dominance behavior of cats in a food competitive test situation.

Experiment #2 - Effect of sensory deprivation on dominance behavior in a competitive shock avoidance test situation.

Subjects: The subjects were seven domestic cats selected from a colony of animals maintained by the Psychology Department at West Virginia University. The Ss ranged in age between ten and seventeen months.

Apparatus: The animals were tested in an aluminum compartment 24" x 36" x 32" long. The floor of the compartment was made of 3/16" stainless steel rods 1/2" on center. A wooden perch or platform 10" x 3 1/2" x 3/4" thick was placed 17" above the grid. Stainless steel rods were also placed on the perch. Power to the grids was monitored by a Davis Scientific Corporation Shock Power Supply and Grid Scrambler. The current and voltage was varied for each individual animal. A door bell buzzer and a 100 watt bulb were used as the conditioned stimulus. Both the CS and the UCS were automatically programmed and timed.

Procedure: Each animal was conditioned to avoid the shock by responding to the light and buzzer which preceded the onset of the shock by 5 sec. Each animal was tested 25 trials a day until they reached the criterion of seven successful avoidance responses in any 10 trials. When all animals had reached this criterion they were given 100 additional trials to assure proficient performance. Following the training period the animals were placed in pairs in the shock compartment and the CS followed 3 sec. later by the UCS was presented. All possible paired comparisons of the seven Ss were tested for five trials per pairing for a series of three paired comparisons. The animal on the perch, which was large enough for only one animal, at the end of the 3 sec. period of shock was considered the dominant animal. Following the pre-isolation dominance tests all subjects were placed in isolation for 21 days. On the seventh, fourteenth and twenty-first days the Ss were removed from isolation and again tested in the shock compartment by the method of paired comparisons.

Results: The pre-isolation distribution of successful escapes from shock determined for all comparisons did not differ from chance as tested by X^2. Even through the pre-isolation tests did not reveal a stable dominance hierarchy the Ss were placed in isolation to determine if the effect of isolation was such as to establish a hierarchy when one did not exist previously. The distribution of successes tested on the seventh, fourteenth and twenty-first day of isolation also did not differ from a chance distribution. It can be concluded that the effect of isolation does not differentially effect the animals, as tested in this situation, in any way which would produce a dominance hierarchy wherein a stable hierarchy did not exist before isolation.

B. Evaluation of findings.

There are several significant features of the investigations. They are:

(1) A stable dominance hierarchy which is formed among a group of eight domestic cats as tested in a food competitive situation remains stable when the Ss are placed in isolation for a 21 day period. It is concluded that isolation, as provided in this experiment, has no differential effect on dominant or submissive animals.

(2) In a competitive shock avoidance test situation, when a stable dominance hierarchy is not found, a twenty-one day isolation period does not change the instructured dominance hierarchy to a structured one.

C. Future research planned for balance of grant period.

No additional research is planned for the balance of the grant period.

D. Plans for publication of results.

The two experiments will be submitted to an appropriate psychological journal. A collateral study initiated by the interest of one of the investigators working on this grant will be submitted to be read at the spring meetings of the Southeastern Psychological Association and later submitted for publication.

E. Possibilities for expanding project into a long range major research effort.

At the present time there are no definite plans to expand the present project into a major research effort. However, the two graduate students who worked on the project have developed an interest in the problem and plan further research in the area. In addition a third graduate student who was indirectly associated with the project now has a post-doctoral fellowship and is planning research in the area.